

Homi Bhabha – A Profile

These days, young people dream of going abroad even before they have completed their studies, often for settling there permanently. Nearly sixty years ago, a young man made the journey in the reverse direction. After spending thirteen years in Cambridge, at that time the Mecca of Physics, Homi Bhabha, then aged twenty nine, came back to India not only to settle down permanently but to change her destiny as well.

Homi Jehangir Bhabha was born on 30 October, 1909 in Mumbai (then Bombay). The house he was born in was later destined to be the cradle of India's Nuclear Energy Programme! Young Homi was educated at the Cathedral and John Connon High School. Absolutely brilliant in studies, he became a minor celebrity. Homi was a voracious reader and his father's wonderful collection helped him to greatly broaden his outlook. In addition, he was also keenly interested in art as well as music (particularly western).

After passing the Senior Cambridge Examination and studying for a couple of years in the Royal Institute of Science, Mumbai, Bhabha went to Cambridge for higher studies. His father wanted Homi to specialise in mechanical engineering so that he could, on return, enter the corporate world of the Tata group of industries and rise to a high position there. But things did not work out that way. Bhabha found that right then, physics was going through a major revolution, a good bit of the action being in Cambridge itself. So he wrote to his father:

I seriously say to you that business or job as an engineer is not the thing for me. It is totally foreign to my nature and radically opposed to my temperament and opinions. Physics is my line ... I am burning with a desire to do physics. I will and must do it sometime. It is my only ambition.

The father was understanding and allowed Homi to study for the Mathematical Tripos, after completing the Mechanical Tripos. In 1932, Bhabha won the Rouse Ball Travelling Fellowship which enabled him to work with Pauli in Zurich and Fermi in Rome. Later, the Isaac Newton Studentship allowed him to spend some time in Niels Bohr's Institute in Copenhagen. In between, Bhabha completed his PhD thesis under the supervision of R H Fowler, who was also the supervisor for S Chandrasekhar.

In Cambridge, Bhabha discovered what is now referred to as *Bhabha scattering*, a phenomenon whose existence has been confirmed experimentally. In addition, he developed, in collaboration with Walter Heitler, a theory for cosmic-ray showers, known as the *cascade theory*. Both these contributions made Bhabha quite well known in physics circles.

In early 1939, Bhabha came back to India for what was supposed to be a brief holiday. Meanwhile, the second World War broke out, and the holiday turned into a permanent stay. War severely disrupted the scientific scene in Europe, and it was clear that Bhabha would have to look for a job in India. Thanks to his reputation, he received a few offers from some Universities but in the end, he joined the Indian Institute



of Science, Bangalore. Here, with a small grant from the Sir Dorab Tata Trust, he started working on cosmic rays.

In the Bangalore period, Bhabha concentrated mainly on theory and discovered what is known as the *Bhabha equation*. Apart from this, he briefly collaborated with Harish-Chandra, later to win fame as a mathematician. Bhabha also tried his hand with experiments, building Geiger-counter telescopes and flying them in air force planes, to study cosmic ray behaviour at high altitudes.

By 1944 it became clear that the war, at least in Europe, was drawing to a close. Bhabha was in two minds about what he should do. Should he go back to the West, which offered so many opportunities, or should he stay? He wrote to his friend J R D Tata seeking his advice, adding that he was ready to continue in India as "it is one's duty to stay in one's own country and build up schools comparable in other lands." J R D encouraged Bhabha to approach the Sir Dorab Tata Trust. Bhabha promptly did so, and in March 1944 he wrote to the Trust seeking grants and promising

*to build up in the course of time a School
of Physics comparable with the best anywhere.*

Prophetically, he also declared that when the time came, the School would provide the experts needed for exploiting nuclear energy, and that India would not have to look for such experts overseas.

Events now moved rapidly. With a small grant of less than Rs 1 lakh per year (of which the Tata Trust's contribution was Rs 45,000/-) Bhabha founded the TIFR on June 1, 1945. It started functioning first in Bangalore but by December, Bhabha had TIFR shifted to Mumbai, locating it in the very house he was born in!

In the beginning TIFR concentrated exclusively on cosmic rays and mathematics, but as bright young people came forward to join it, it rapidly expanded in size as well as scope. Meanwhile the country became independent, and Bhabha, on account of his closeness to Nehru, was given the task of steering the country's nuclear energy programme. Bhabha's enthusiasm was infectious, and it was like a breath of fresh air in a country notorious for its negative and bureaucratic thinking (which, alas, persists). Both TIFR and the Indian Atomic Energy Programme blossomed in a few short years to proportions unimaginable and beyond all expectations.

Bhabha was a thorough-bred theoretical physicist, deeply influenced by Dirac. Yet, when it came to matters of technology, he was second to none. He also laid the seeds for our very successful space programme, which later Vikram Sarabhai and Satish Dhawan nursed with loving care. After the Chinese attack on India in 1962, Bhabha realised our backwardness in electronics and worked hard to prepare a masterplan to help the country leapfrog in this vital area. Unfortunately, he died before the report he had prepared (called the Bhabha Committee Report) could be submitted. Later, like all reports, this one too collected dust, and we never made the big jump in electronics we could have.

Bhabha was riding high, all the time reaching new pinnacles, but death came suddenly. In January 1966, Bhabha was on his way to Vienna to attend a meeting. As his Air India plane descended to land



in Geneva, it crashed into Mont Blanc. All the passengers including Bhabha perished. His body was never found. For the nation, it was an irreparable loss.

Bhabha was not merely a gifted scientist, and an able technocrat; he was much more. He was an artist, and a connoisseur of all the good things in life – art, music, literature, architecture, landscaping, gardening, ... Many hailed him as a modern Leonardo while JRD referred to him as an authentic genius. He represented the best in both science as well as culture, often regarded as unbridgeable. Expressing the sorrow of the nation, Indira Gandhi said of him:

He was a scientist of great originality. He was an artist endowed with unusual sensitivity. His interest in music was as serious as it was deep. The flower beds, the landscaping, the architecture of buildings in Trombay, all bear witness to Homi Bhabha's perception of colour, form and design. India will long cherish Homi Bhabha's memory, for he was deeply involved in her destiny and in the process of changing the texture and quality of her society.

Way back in 1928, Bhabha told his father: "Who says we can't do science in India?" Not only did he convincingly demonstrate later that he could, but, more important, he made it possible for hundreds if not thousands of others also to do likewise.

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*Albert Einstein, Hideki Yukawa,
John Archibald Wheeler and
Homi Jehangir Bhabha in Princeton
around 1950.*

